

**Economics Research Group**  
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**IBMEC RJ ECONOMICS DISCUSSION PAPER 2005-08**

*Full series available at <http://professores.ibmecrj.br/erg/dp/dp.htm>.*

# **TRUST-BASED TRADE**

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# Trust-Based Trade

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September 2005

## Abstract

There is substantially more trade within national borders than across borders. An important explanation for this fact is the weak enforcement of international contracts. We develop a model in which agents build reputations to overcome this institutional failure. The model describes the interplay between institutional quality, reputations and the dynamics of international trade. It also rationalizes several empirical regularities. We find that history matters for trade volumes, but that its effects vary with the institutional setting of the country. The same is true for the efficacy of trade liberalization programs. Moreover, while stricter enforcement of contracts enhances trade in the short run, it makes it harder for individual traders to develop good reputations. We show that this indirect negative effect may produce an "institutional trap": for sufficiently low initial levels of contract enforcement, a small tightening in enforcement reduces future trade flows. We find also that search frictions aggravate the problems created by weak enforceability of contracts, even if they impose no direct cost on agents, but that trade liberalization can mitigate these negative effects.

**JEL Classification:** F10, F23, D83, L14

**Key Words:** International trade, Export dynamics, Contract enforcement, Reputation

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“While performance is the glue of buyer-seller relationships, the trust that is built as partners gain experience with each other is the lubricant.” [Egan and Mody 1992, p. 326]

## 1 Introduction

Countries trade too little with each other relative to what they trade with themselves. An explanation for this fact is the weakness of contract enforcement across international jurisdictions. As Rodrik (2000, p. 179) argues, “Transaction costs arise from various sources, but perhaps the most obvious is the problem of contract enforcement. When one of the parties reneges on a written contract, local courts may be unwilling—and international courts unable—to enforce a contract signed between residents of two different countries. Thus, national sovereignty interferes with contract enforcement, leaving international transactions hostage to an increased risk of opportunistic behavior.” Since rational agents anticipate that possibility, they trade less internationally than they do within national borders.

The primary motivation for our paper relies on Rodrik being right—i.e., the idea that contract enforcement is an important determinant of international transactions. We argue, in addition, that traders build reputations within their relationships to mitigate the difficulties created by asymmetric information when international contracts are not properly enforced. In this context, we characterize *how*, more precisely, enforcement of contracts matters for international trade.

We develop a two-country dynamic model, where potential exporters from one country form partnerships with distributors in the other country without knowing the type of each distributor. We show that weak enforcement of international contracts depresses international trade, but facilitates the formation of reputations; the latter moderates the negative impact of weak enforcement on trade. Still, since the process of reputation building is time-consuming, the volume of international trade remains low relative to the levels attained when contracts are properly enforced. In this sense, reputation is an imperfect substitute for adequate contract enforcement. In the long run, however, reputations can become a perfect substitute if distributors are sufficiently patient. That is, if a partnership between an exporter and a distributor goes on indefinitely, the reputation of the latter becomes eventually so high that it makes contract enforcement irrelevant within that partnership.

Our analysis shows that tightening the enforcement of contracts in a country would have a direct positive effect on trade but also an indirect negative effect, because it would slow down the process of reputation building. The net effect on trade flows within existing partnerships would then depend on both the horizon of the analysis and the initial level of contract enforcement. In the short run, when reputations are given, trade would increase for sure. However, because an increase

in institutional quality has also the perverse effect of making exporters more pessimistic about the honesty of their distributors, future trade flows would fall if the initial level of enforcement were too low. In general, we show that the effect of stricter contract enforcement on trade flows is higher, the higher the initial level of enforcement, indicating that there may be "increasing returns" to contract enforcement: the higher its current level, the greater the impact on trade flows of increasing it further.

Additional results follow when we incorporate search frictions into our basic setting. We assume that when a producer searches for a distributor, he may meet with one who is incapable of distributing his good, in which case the producer does not export in that period. A producer can, however, search for as many periods as he wants at no cost. Despite this essentially costless search process, we find that search frictions aggravate the problem created by incomplete information about distributors' types, carrying it from the partnership level to the aggregate level. The reason is that distributors who honor contracts become available for a match only if their previous matches were with producers whose products they were unable to distribute. Myopic distributors, on the other hand, become available for that reason and also because they may have defaulted on contracts in a previous relationship. As a result, the average quality of the pool of distributors with whom producers can meet deteriorates continuously. Eventually, the prior formed by potential exporters regarding their possible matches becomes so pessimistic that they stop searching, even though they know that some patient distributors are still available. Thus, with search frictions, the market does not replicate the perfect information equilibrium even in the long run.

Trade liberalization can mitigate this problem. When tariffs are reduced, the value of forming foreign partnerships increases and it pays to search further for distributors. Through this process, trade liberalization affects the extensive margin of trade, promoting entry in the export market.

We also show that the effect of lower tariffs on the volume of trade within existing partnerships depends on the levels of both the reputation within the partnership and the country's level of contract enforcement. We find in particular that, under certain conditions, trade liberalization is more effective in promoting trade within new partnerships, suggesting that history matters for the efficacy of trade liberalization.

Numerous case studies provide anecdotal support for our hypotheses that contract enforcement is important for international trade and that agents rely on trust when enforcement is lenient. For example, Woodruff (1998) documents the difficulties faced by exporters in Mexico's footwear industry seeking to enter foreign markets created by the high cost of taking legal actions abroad. Egan and Mody (1992, p. 327), through a series of interviews with U.S. entrepreneurs in the bicycle and footwear industries, find that "buyers consider trust an essential adjunct to formal legal agreements, and some even use trust as a substitute."

Recently, economists have begun to assess these issues more formally. Anderson and Marcouiller (2002), as well as Ranjan and Lee (2003), find strong evidence that contract enforcement is a key determinant of international trade flows. Izquierdo et al. (2003) find, in turn, that firms' reputations in third countries are an important factor in explaining bilateral trade flows. And McMillan and Woodruff (1999), analyzing Vietnam, show forcefully how relationships based on trust arise and develop in environments where contract enforcement is virtually absent.<sup>1</sup>

The available evidence, therefore, appears to leave little doubt about the importance of contract enforcement and of reputations in international trade. Yet there has been no formal theoretical analysis within the trade literature that integrates these two elements.<sup>2</sup> Anderson (2003) and Anderson and Young (2003) recognize the obstacles created by ineffective enforcement of international contracts, but study instead countries' *choices* of enforcement levels. McLaren (1999) characterizes, in a static model, the circumstances under which firms *choose* to base their relationships on trust instead of on (enforceable) contracts. We abstract from the issues McLaren focuses on—industry structure and relationship-specific investments—to concentrate on the dynamics of trust within partnerships when perfectly enforceable contracts are unavailable. Chisik (2003) examines instead how the perception about producers from (otherwise identical) countries can become self-fulfilling and affect their choices of qualities, thus creating “reputational comparative advantages.” Greif (1993), in turn, analyzes how limited contract enforceability and a precarious communications system induced medieval merchants to build coalitions based upon reputation to sustain trade. He considers, however, a complete information economy, and his main goal is to explain why merchants employed a system of collective, instead of individual, punishment for dishonest agents. None of these papers, however, analyzes the dynamic process in which firms engaged in international exchange build reputations as a response to the imperfect enforceability of contracts.<sup>3,4</sup>

Interestingly, our results match very closely the qualitative findings of Johnson et al. (2002). Using surveys of manufacturing firms in transition economies, they find that the volume of transac-

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<sup>1</sup>McMillan and Woodruff (1999) base their analysis on a survey of managers of Vietnamese private firms. According to the survey, 91 percent of the managers believe they cannot rely on the courts to enforce contracts.

<sup>2</sup>In fact, in Anderson's (2004) survey of the nascent literature on the reactions to the problems created by the lack of adequate contract enforcement in international transactions, there is no reference to formal analyses of the role of reputations.

<sup>3</sup>Ghosh and Ray (1996) and Watson (2002) study agents' incentives to establish long-term relationships as well. Ghosh and Ray's context is one of a community with multiple agents who face informational asymmetries, while Watson considers a two-player repeated game environment with two-sided informational asymmetries. Institutional elements such as the level of contract enforcement in a country, however, play no role in either analysis.

<sup>4</sup>In a different context, the literature on sovereign debt also studies the effect of reputational concerns, but on the incentives of governments to honor international contracts. See Eaton and Fernandez (1995) for a survey of that literature.

tions within partnerships grows steadily. This practice of “start small and increase quantities over time” appears to be very common among firms entering export markets (see e.g. Egan and Mody 1992). Here, we rationalize it by showing how each exporter increases exports as he becomes convinced that his distributor will not behave opportunistically. This practice has been explained also by Rauch and Watson (2003), in a setting with asymmetric information, costly search and buyers who need to make irreversible investments to train foreign suppliers. We show that, if contracts are not perfectly enforced, firms may want to “start small” even when those last two elements are absent.

Johnson et al. (2002) find also that, while stricter enforcement of contracts has no clear effect on long-lasting partnerships, it boosts transactions within new partnerships. This is precisely what our model predicts: in the former case, reputations are already consolidated, so contract enforcement is pointless. In the later case, since there remains significant uncertainty about the types of distributors, the short-run impact of stricter contract enforcement within partnerships is necessarily positive (even though its long-run effect may be negative, as indicated above).

Our model rationalizes also Eichengreen and Irwin’s (1998) finding that (aggregate) trade flows display hysteresis, as well as some strong empirical regularities documented by recent research on exporting behavior at the plant and firm level (see Tybout 2003 for a survey of that literature). Two robust findings in that line of research are that, for most industries, only a relatively small number of producers in a country export, and that a producer is more likely to export in a certain period if he exported in the previous period. The standard explanation for these phenomena is the existence of firms’ sunk costs to begin exporting, but the precise nature of those costs remains unclear. Our model indicates that they reflect, at least partially, informational asymmetries and imperfect enforceability of contracts. It suggests, in addition, that the difficulties to begin exporting are *market-specific*, consistently with the findings of Eaton et al. (2004) that firms typically export to only a few markets. Our model, therefore, supports the use of measures for the lack of contract enforceability as proxies for the sunk costs necessary to begin exporting to individual countries.

The paper proceeds as follows. Section 2 describes the model. Section 3 analyzes the behavior of exporters. Section 4 analyzes the behavior of distributors and characterizes an equilibrium of the model. Section 5 describes the dynamics of trade, while Section 6 introduces search frictions. Implications for trade policy are discussed in Section 7. Section 8 concludes.

## 2 Model

Our main goal is to study situations where the lack of contract enforcement depresses international trade. Such situations arise when exporters have to do business with agents in the importing

country but cannot rely on the legal system to prevent opportunistic behavior by those agents. We develop an environment with these characteristics. It is based on three main elements, which we briefly discuss in turn.

**i. Contacting distributors**

Contacting distributors in the importing country appears to be a critical decision in the process of exporting. According to the Home Based Business Opportunities, for example, "The most important step in setting up your business is finding the contacts ... for commercial distribution." Similarly, the U.S. Department of Commerce (2000, p. 23) argues that once a "company is organized to handle exporting, a proper channel of distribution needs to be carefully chosen for each market," while warning potential exporters that they "should investigate potential representatives or distributors carefully before entering into an agreement." We want to study precisely these types of situations, where exporters have to establish channels of distribution in the importing country, and have to do so cautiously, because distributors can behave opportunistically and will indeed do so if they have a relatively short horizon and are not inhibited by the legal system.

**ii. Credit-based relationships**

We consider that exporters and distributors base their relationships on credit. In particular, we assume that in each period an exporter consigns goods to a distributor, who has the opportunity to abscond with the full proceeds from the sales of the goods.

Commercial transactions are indeed largely based on credit.<sup>5</sup> This approach is also particularly useful to study situations where export activities are subject to opportunistic behavior. We assume that, while exporters need distributors in the importing country to operate in that market, an imperfectly functioning legal system creates uncertainty about whether the distributors will respect their formal agreements. Now, while there are many dimensions in which exporters may have to rely on agents in the importing country without full legal protection, allowing distributors to "run away" with the proceeds from their sales is arguably the simplest way to capture the possibility of opportunistic/dishonest behavior by those agents. Similarly, while enforcement of contracts matters in several dimensions of a business relationship, making sure bills are paid is perhaps the clearest among these situations.

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<sup>5</sup>Interestingly, transactions are often based on credit even in environments where there is virtually no legal protection, as McMillan and Woodruff's (1999) analysis of the business conditions in Vietnam clearly exemplifies: despite widespread skepticism about the effectiveness of the judicial system, over 50 percent of the business relationships in Vietnam involve trade credit.

### iii. Measure of institutional quality

Naturally, the more lenient a country's legal system is in enforcing international contracts, the more easily distributors can evade contractually specified payments to exporters. There are different ways in which we can capture institutional quality in this context. Ranjan and Lee (2003) and Anderson and Young (2003), for example, use a parameter to represent the proportion of contracts that the legal system enforces. In the same spirit, we measure the quality of a legal system by the opportunities for corruption that it prevents. Specifically, our measure of institutional quality corresponds to the measure  $\lambda \in (0, 1)$  of non-corrupt legal agents in the importing country.

We now describe our environment in more detail.

## 2.1 Environment

Consider an economy with two countries, Home and Foreign. In Home there is a  $[0, 1]$  continuum of infinitely lived producers and a  $[0, 1]$  continuum of differentiated goods. Only one producer can manufacture each good, and marginal costs of production are constant at  $c$ . Producers can sell goods in their own market directly, but have no direct access to Foreign's market. To become exporters, they need to form a partnership with a distributor from Foreign. Producers discount the future at a rate  $\delta_e$ , where  $\delta_e \in (0, 1)$ .

In Foreign, there is a  $[0, 1]$  continuum of infinitely lived agents with the ability to internally distribute imported goods. Distributors in Foreign can be either patient or myopic; the measure of myopic distributors is  $\theta_0$ . A patient distributor ( $p$ ) is forward-looking with a discount factor  $\delta_d \in (0, 1)$ , while a myopic distributor ( $m$ ) only maximizes current profits. The type of a distributor is his private information.

A producer always serves the local market. He can become also an exporter by searching for a distributor in Foreign. Meetings between producers and distributors are pairwise and happen once each period. When searching for a distributor, a producer faces an informational friction, since he does not observe the type of a distributor. To focus on the role played by information frictions, we initially assume that a producer from Home finds an agent in Foreign with the ability to distribute his good with certainty. In Section 6 we relax this assumption and consider the case where there are also search frictions.

Consider an ongoing partnership between an exporter and a distributor. In every period, the exporter decides whether to maintain the partnership. If the exporter wants to keep the partnership, he proposes a contract to the distributor. Now, since distributors have incentives to build reputations only if contracts do not induce a separation between a myopic and a patient distributor, in what follows we restrict the class of contracts so that such separation is not possible during the



contracting stage. More specifically, we assume that the exporter proposes a one-period contract<sup>6</sup> to the distributor specifying the quantity to be exported, an exogenous distribution of the revenue (the exporter and the distributor receive strictly positive fractions  $\alpha$  and  $1 - \alpha$  of the revenue, respectively), and no side payments. If the contract is accepted, the exporter produces the quantity specified in the contract, bears the production costs and pays a fixed cost  $\kappa > 0$ .<sup>7</sup> Otherwise, both the exporter and the distributor earn zero profits.

In reality, exporters probably screen the reliability of foreign distributors both with contracts and with experience. We do not allow the former because we want to focus on the mechanics of the latter. Thus, the purpose of contracts here is only to define export volumes.

Note, however, that these restrictions on possible contracts are driven mainly by our assumption that some distributors have strictly no concern about the future. With a more sophisticated description of these distributors, we could allow for a broader range of contracts and still capture the dynamic incentives to build reputations.<sup>8</sup> We choose to model some distributors as myopic—and then restrict contracts to a simple form—because this formulation uncovers the main ideas about reputation in a simpler and more direct way.

Now consider the problem of a distributor on whether to perform according to the contract specifications or to default on the contract. First, note that a myopic distributor would like to default whenever he has the opportunity to do so. In what follows, we want to emphasize that this opportunity is closely linked with the institutional quality of the foreign country. We formalize this idea as follows. We assume that before making the decision on whether to default, the distributor can randomly search for a legal agent in Foreign. Legal agents are either corrupt or honest, with the measure of honest agents being denoted by  $\lambda \in [0, 1]$ . A distributor gets away with a default only when he meets with a corrupt legal agent. Clearly, this assumption implies that a myopic distributor will have a strict incentive to default whenever he meets a corrupt agent but no incentive to default upon meeting an honest agent. We assume also that exporters do not observe the possible

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<sup>6</sup>Such short-term contracts conform well to actual businesses practices. As Egan and Mody (1992, p. 326) report, “Relationships tend to grow incrementally, with their duration and depth more evident *ex post* than *ex ante*. A relationship often begins with a short-term agreement—perhaps a one-year production contract—and continues with annual renewals ... Thus, a close, long-term relationship may arise with no more formal structure than a continuing series of renewed short-term contracts.” Similarly, the U.S. Department of Commerce (2000, p. 28) points out that “some U.S. companies prefer to begin with a relatively short trial period and then extend the contract if the relationship proves satisfactory to both parties.”

<sup>7</sup>This fixed cost captures in a simple way the exporter’s opportunity cost to engage in business in Foreign.

<sup>8</sup>One possibility is to have some distributors being, instead of myopic, of a behavioral type, in the sense that they always mimic the choice of the patient distributor during the contractual negotiation but may default afterwards. In that case, no constraints on the form of contracts would be required, since contracts could not reveal any information about the distributor’s type, which is the condition necessary for reputation to have value in equilibrium.

interactions between distributors and legal agents in Foreign.

### 3 Exporter's Behavior

We analyze the behavior of exporters by considering a generic partnership between an exporter and a distributor. Throughout this section, we *assume* that a patient distributor never wants to default and a myopic distributor defaults whenever he finds a corrupt legal agent. In the next section, we prove that this behavior is part of an equilibrium as long as  $\delta_d$  is high enough.

The problem of the exporter is as follows. In every period, he decides whether to maintain the partnership. If he chooses to do so, he writes a one-period contract with the distributor establishing the volume of output to sell in Foreign. We consider first how this quantity is determined.

#### 3.1 Contract

Consider a contract signed at date  $t$  and let the exporter's belief that the distributor is myopic be denoted by  $\theta$ . The exporter pays the cost of production and receives a fraction  $\alpha$  of the revenue if the distributor does not default. There is a probability  $1 - \theta$  that the distributor is patient, in which case we claim that he never defaults. However, if he is myopic, he defaults whenever he does not expect the legal system to enforce his contract, an event with probability  $1 - \lambda$ . Under the proposed strategy for the distributors, the exporter's expected profit when the contract establishes a production level of  $q$  is then

$$\pi(q, \theta; \lambda, \alpha, c, \kappa) = -cq + \alpha[\theta\lambda + 1 - \theta]R(q) - \kappa, \quad (1)$$

where  $R(q)$  is the revenue from selling  $q$  units in Foreign.<sup>9</sup>

Note that our assumptions on the structure of the contract imply that it cannot be used to extract information about the distributor's type. Hence, when proposing a contract, the exporter chooses  $q$  to maximize  $\pi(q, \theta; \lambda, \alpha, c, \kappa)$ . The first-order necessary condition associated with this problem is

$$-c + \alpha[\theta\lambda + 1 - \theta]R'(Q) = 0, \quad (2)$$

where  $Q$  denotes the exporter's optimal quantity. It depends on the belief  $\theta$  of the exporter, the institutional parameter  $\lambda$ , the exogenous sharing rule, and the marginal cost of production:  $Q = Q(\theta; \lambda, \alpha, c)$ . Note that condition (2) requires  $R'(Q) > 0$ , whereas the second-order necessary condition for  $Q$  requires  $R''(Q) < 0$ .

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<sup>9</sup>Since marginal costs are constant, domestic sales do not affect foreign sales, and vice versa. Notice also that we keep final consumers on the background, dealing directly with revenue functions.

It follows from condition (2) that

$$\frac{\partial Q}{\partial \theta} = \frac{(1 - \lambda)R'(Q)}{[\theta\lambda + 1 - \theta]R''(Q)} < 0. \quad (3)$$

Thus, the optimal export quantity expands as the belief that the distributor is myopic decreases. It follows from (2) also that, for a given  $\theta$ , the current volume of trade expands when legal stability improves ( $\partial Q/\partial \lambda > 0$ ).<sup>10</sup>

We assume that parameters  $\lambda, \alpha$  and  $\kappa$  satisfy the following conditions:

$$\begin{aligned} A1 & : Q(1; \lambda, \alpha, c) > 0 \\ A2 & : \pi(Q, 1; \lambda, \alpha, c, \kappa) < 0 \\ A3 & : \pi(Q, 0; \lambda, \alpha, c, \kappa) > 0. \end{aligned}$$

Thus, the quantity that maximizes current *variable* expected profits is strictly positive even when the exporter is certain that the distributor is myopic ( $\theta = 1$ ). In that case, however, the exporter's current (total) expected profit is strictly negative. In contrast, when the exporter is certain that the distributor is patient ( $\theta = 0$ ), his current (total) expected profit is strictly positive.

Given assumptions A1-A3, it is clear that when  $\theta = 1$ , the exporter terminates the partnership and produces only for the domestic market. Note, however, that the same reasoning does not necessarily hold for values of  $\theta$  close to 1. In that case, even though profits are still negative (since  $\pi$  is a continuous function of  $q$  and  $\theta$ ), it may be optimal to produce because this will generate additional information about the type of the distributor.

### 3.2 Information

In every period, the exporter has to decide whether to maintain the partnership with the distributor he is paired with. This decision depends critically on the exporter's belief about the type of the distributor. For example, if he believes that there is a high probability that the distributor will attempt to default on the contract, he will likely prefer to terminate the partnership.

The exporter updates his belief with respect to the type of the distributor through his experience in the partnership. This experience reflects all previous decisions made by the distributor. Under the proposed strategy for the distributors, if the exporter observes a default, he forms a posterior equal to 1, since he immediately concludes that the distributor is myopic. Alternatively, if he does

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<sup>10</sup>Note in addition that, if enforcement of contracts is stricter when the involved parties are within the same national jurisdiction, as it appears to be the rule, then exporters will tend to sell more domestically than in foreign markets, in line with the findings in the empirical literature on plant-level exporting behavior (see Tybout 2003).

not observe a default, he adjusts his belief about the distributor's type according to the Bayes rule:

$$\theta(\{\text{no default}\}, \theta) \equiv \Pr(m \mid \{\text{no default}\} \cap \theta) = \frac{\lambda\theta}{\lambda\theta + 1 - \theta} < \theta. \quad (4)$$

Note that the adjustment in  $\theta$  is downwards in this case. That is, when the exporter does not observe a default, he increases his belief that the distributor is patient.

More generally, let 0 indicate a record of no default and 1 indicate a record of default in a given experience and define  $\theta_t(C)$  as the belief that the distributor is myopic given an experience  $h^t$  with size  $t$  and cardinality  $C$ , where  $C \equiv \sum_{j=1}^t h_j$ ,  $h_j \in \{0, 1\}$ . Under the assumed strategy for the distributor, the exporter's belief is given by

$$\theta_t(C) = \begin{cases} \frac{\lambda^t \theta_0}{\lambda^t \theta_0 + 1 - \theta_0} & \text{if } C = 0 \\ 1 & \text{if } C \neq 0. \end{cases} \quad (5)$$

Note that  $\theta_t(0)$  decreases with  $t$  and converges to zero when  $t$  goes to infinity. That is, if a distributor never defaults, in the long run the exporter becomes convinced that the distributor is patient. We interpret  $\theta$  as the *reputation* of the distributor. A reputation of being patient means that the belief  $\theta$  of the exporter regarding the distributor in their partnership is small.

We now take as given the function  $Q$  and the updating process described in equation (5) and look at the exporter's decision between maintaining a partnership and terminating it.

### 3.3 Partnership

Consider an exporter at date  $t$  facing the decision on whether to maintain a partnership. Since the only new information he accumulates over time comes from his experience with the distributor, each possible experience up to date  $t$  represents an information set upon which he can base his decision. Moreover, we know from expression (5) that all relevant information in an experience can be captured by the belief  $\theta$  associated with it. Given  $\theta$ , the exporter computes both the optimal quantity to export and, given the assumed strategy for the distributors, the distribution of the next period's beliefs. These two elements affect, respectively, the flow and the continuation payoff of maintaining a partnership. The flow payoff corresponds to the current profit  $\pi(\theta)$ , where

$$\pi(\theta) \equiv -cQ + \alpha[\theta\lambda + 1 - \theta]R(Q) - \kappa. \quad (6)$$

To find the continuation payoff of maintaining a partnership, recall that after observing a default, the exporter immediately concludes that the distributor is myopic and updates his posterior to  $\theta = 1$ . Assumption A2 then implies that the exporter terminates the partnership. Alternatively, if the exporter does not observe a default, he increases his belief that the distributor is patient. Since

the exporter's profit is a decreasing function of  $\theta$ , the exporter does not terminate the partnership in this case.

This reasoning implies that the exporter's expected profit can be described in terms of a value function  $v(\theta)$  as this:<sup>11</sup>

$$v(\theta) = \max \{0, \pi(\theta) + \delta_e \Pr(0 \mid \theta) v[\theta(0, \theta)]\}, \quad (7)$$

where

$$\Pr(0 \mid \theta) = 1 - \theta + \lambda\theta \quad (8)$$

is the probability of no default given the belief  $\theta$ . Expression (7) can be interpreted as follows. At every date, if the exporter decides to maintain the partnership, he receives expected profits of  $\pi(\theta)$  and, through his experience, obtains additional information about the distributor's type. Note that this reasoning presumes that an exporter will never attempt to form a new partnership after terminating one. This is a direct consequence of the fact that, after date 0, only myopic distributors are available to form new partnerships.<sup>12</sup>

Lemma 1 describes the exporter's optimal decision as a function of his belief  $\theta$ .

**Lemma 1** *Assume that a patient distributor never wants to default and a myopic distributor defaults whenever he finds a corrupt legal agent. Then, the problem of the exporter has an unique optimal solution. He starts the partnership at date 0 as long as his prior is smaller than  $\bar{\theta}$ , where  $\bar{\theta} \in (0, 1)$ . If the exporter observes a default, he terminates the partnership and produces only for the local market from that period on. If the exporter does not observe a default, he maintains the partnership. At any period when the partnership is active, he exports  $Q(\theta; \lambda, \alpha, c)$ .*

**Proof.** First, since  $Q(\theta; \lambda, \alpha, c)$  maximizes  $\pi(q, \theta; \lambda, \alpha, c, \kappa)$ , it must be the quantity established in any contract. Assumption A2 and the Bayesian updating in (5) imply that the exporter terminates the partnership after the realization of a default. Moreover, since all available distributors from date 1 on are myopic, an exporter never attempts to form a new partnership after date 0.

Now, to show the existence of the threshold  $\bar{\theta}$ , consider the exporter's decision to start a partnership at date 0. If he enters the partnership, his expected payoff is

$$\tilde{v}(\theta_0) = \pi(\theta_0) + \delta_e \Pr(0 \mid \theta_0) v(\theta_1(0)), \quad (9)$$

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<sup>11</sup>We do not include domestic profits in  $v(\theta)$ , since they do not affect (and are not affected by) the decision on whether to keep the foreign partnership.

<sup>12</sup>In Section 6, when we introduce search frictions, the pool of available agents after date 0 includes patient distributors as well.

where  $v(\theta_1(0))$  is given by (7) evaluated at  $\theta = \theta_1(0)$ . Substituting for  $v(\theta_1(0))$  in (9), we obtain

$$\tilde{v}(\theta_0) = \pi(\theta_0) + \delta_e \Pr(0 \mid \theta_0)[\pi(\theta_1(0)) + \delta_e \Pr(0 \mid \theta_1(0))v(\theta_2(0))].$$

Repeating the same substitution and using (8), we can rewrite equation (9) after some manipulation as

$$\tilde{v}(\theta_0) = \pi(\theta_0) + \sum_{i=1}^{\infty} \delta_e^i \pi(\theta_i(0)) \prod_{j=0}^{i-1} (1 - \theta_j(0) + \lambda \theta_j(0)).$$

Note that, from expressions (6) and (5),

$$\frac{\partial \pi(\theta_i(0))}{\partial \theta_0} = \frac{\partial \pi(\theta_i(0))}{\partial \theta_i(0)} \frac{\partial \theta_i(0)}{\partial \theta_0} = \frac{-\alpha(1 - \lambda)R[Q(\theta_i(0); \lambda, \alpha, c)]\lambda^i}{(1 - \theta_0 + \lambda^i \theta_0)^2} < 0.$$

Moreover, each component of  $\prod_{j=0}^{i-1} (1 - \theta_j(0) + \lambda \theta_j(0))$  is also a strictly decreasing function of  $\theta_0$ . We can then conclude that, in the domain  $\theta_0 \in [0, 1]$ ,  $\tilde{v}(\theta_0)$  is a strictly decreasing function. Now, since

$$\tilde{v}(0) = \frac{\pi(0)}{1 - \delta_e} > 0$$

by A3 and

$$\tilde{v}(1) = \frac{\pi(1)}{1 - \delta_e \lambda} < 0$$

by A2, there is a unique value  $\bar{\theta}$  such that

$$\begin{cases} \tilde{v}(\theta) \leq 0 & \text{if } \theta_0 \geq \bar{\theta} \\ \tilde{v}(\theta) > 0 & \text{if } \theta_0 < \bar{\theta}. \end{cases}$$

Hence, an exporter enters in a partnership if and only if his prior  $\theta_0$  is below the threshold  $\bar{\theta}$ . ■

Throughout the paper, we assume  $\theta_0 < \bar{\theta}$ . Hence, at date 0 all producers want to form partnerships and become exporters. Note that the exporter's problem is potentially rather complex. Exporters need to make a decision after every experience they face, and the set of possible experiences tends to increase as time goes on. The key element in our model that avoids these complications is our assumption that “bad outcomes” from the perspective of exporters are always caused by opportunistic behavior of distributors. This implies that the construction of a good reputation takes time, whereas a bad reputation can be acquired in a single period. The central advantage of this simplification is that it allows us to generate precise, clear-cut results on the relationship between the history of a partnership and its corresponding volume of trade. We discuss this issue further in Section 5.<sup>13</sup>

<sup>13</sup>In Araujo and Ornelas (2004), we consider the case where exporters may face bad outcomes even when distrib-

## 4 Distributor's Behavior and Equilibrium

We now solve the distributor's problem and characterize an equilibrium of the partnership between the exporter and the distributor. Note that, since the exporter pays the cost of production, the gain of the distributor inside a partnership is always positive. Therefore, a contract never violates the distributor's participation constraint.

Consider then the problem faced by a myopic distributor. By definition, he does not care about the future and thus does not bother to build reputations. As a result, he has an incentive to default and keep the whole revenue whenever he meets a corrupt legal agent. When a myopic distributor meets an honest agent, he is indifferent between defaulting and not. We break this indifference by assuming that he does not default in that case.<sup>14</sup>

A patient distributor, on the other hand, anticipates that after a default his partnership will be terminated. Hence, as long as he is not too impatient, he does not default. In particular, if the discount factor of a myopic distributor is at least as large as the exporter's share of the revenue, the distributor does not default. Lemma 2 formalizes this claim.

**Lemma 2** *Assume that exporters behave as described in Lemma 1. Then, there is a value  $\underline{\delta}_d \in (0, \alpha]$  such that, for all  $\delta_d > \underline{\delta}_d$ , the optimal choice of a patient distributor is to always honor his contract.*

**Proof.** Consider the problem of a patient distributor at some date  $t$ . He does not deviate from the strategy of never defaulting as long as

$$(1 - \alpha) \sum_{k=t}^{\infty} \delta_d^k R[Q(\theta_k(0); \lambda, \alpha, c)] > R[Q(\theta_t(0); \lambda, \alpha, c)]. \quad (10)$$

Now, since

$$\frac{\partial \theta_t(0)}{\partial t} = \frac{\lambda^t \ln \lambda \theta_0 (1 - \theta_0)}{(\lambda^t \theta_0 + 1 - \theta_0)^2} < 0$$

from equation (5) and

$$\frac{\partial R[Q(\theta_t(0); \lambda, \alpha, c)]}{\partial \theta_t(0)} = \frac{(1 - \lambda) \{R'[Q(\theta_t(0); \lambda, \alpha, c)]\}^2}{[1 - \theta_t(0)(1 - \lambda)] R''[Q(\theta_t(0); \lambda, \alpha, c)]} < 0$$

---

utors do not behave opportunistically, for example because of a negative demand shock not observed by foreigners. In that case, both good and bad reputations require time to be established. It turns out that the optimal behavior of an exporter also involves a threshold  $\theta'$  such that a partnership is terminated if and only if the posterior  $\theta$  of the exporter becomes higher than  $\theta'$ . The solution method is, however, more demanding and involves the interpretation of the exporter's problem as a Two-Armed Bandit Problem.

<sup>14</sup>He would strictly prefer to not default in that case if, for example, he had to pay a fee when he loses in court.

from equation (3), we know that  $R(\cdot)$  is increasing in  $t$ . Therefore,

$$(1 - \alpha) \sum_{k=t}^{\infty} \delta_d^k R[Q(\theta_k(0); \lambda, \alpha, c)] \geq \frac{(1 - \alpha) R[Q(\theta_t(0); \lambda, \alpha, c)]}{1 - \delta_d}.$$

A sufficient condition for inequality (10) to hold at any  $t$  is then

$$\frac{(1 - \alpha) R[Q(\theta_t(0); \lambda, \alpha, c)]}{1 - \delta_d} > R[Q(\theta_t(0); \lambda, \alpha, c)]$$

for all  $\theta_t(0)$ , or

$$\delta_d > \alpha.$$

Since this condition is only sufficient but not necessary, then there exists a  $\underline{\delta}_d \in (0, \alpha]$  such that, for all  $\delta_d > \underline{\delta}_d$ , the optimal choice of a patient distributor is to always honor his contract. ■

We now show that the exporter's behavior described in Lemma 1 and the distributor's behavior described in Lemma 2 are part of an equilibrium.

**Proposition 1** *The exporter always starts a partnership at date 0, chooses quantities according to the function  $Q(\theta; \lambda, \alpha, c)$ , and maintains the partnership as long as he observes no default. A myopic distributor defaults if and only if he finds a corrupt legal agent. A patient distributor never defaults. Irrespective of his type, the distributor never terminates the partnership. This strategy profile, together with the Bayesian updating described in equation (5), is a sequential equilibrium.*

**Proof.** If the partnership is terminated, the probability that the distributor will meet another exporter in the future is zero, since the exporters anticipate that the distributors available after  $t = 0$  are all myopic. Therefore, the distributor never wants to separate from the exporter. From Lemma 2, we know that a patient distributor chooses to honor contracts as long as  $\delta_d > \alpha$ . In contrast, myopic distributors default whenever they find a corrupt legal agent, since they just maximize current profit. Note now that, by construction, the exporter's strategy is a best reply to the distributor's strategy. Moreover, it is sequentially rational by the principle of optimality. Finally, since beliefs are defined by the Bayes' rule after every possible experience, including the ones that are never reached in equilibrium, they are consistent. ■

## 5 Dynamics of Trade

We can now describe how the volume of trade within a partnership evolves under the equilibrium described in Proposition 1. Note first that, even though the type of a distributor is crucial to



determine the probability that a partnership lasts, the actual volume of trade depends only on the distributor's reputation. This is so because there is only one experience that arises with positive probability within an ongoing partnership, i.e., a sequence of no defaults. This feature of the model allows us to concentrate on the evolution of the export volume irrespective of the type of the distributor the exporter is paired with.

Note also that there is a one-to-one correspondence between the distributor's reputation and the time span of the partnership. Therefore, we can obtain a clear relationship between the export volume and the age of the partnership. With some abuse of notation, let  $\theta_t \equiv \theta_t(0)$ . Then, since

$$\frac{\partial Q_t}{\partial \theta_t} = \frac{(1 - \lambda)R'(Q_t)}{[1 - \theta_t(1 - \lambda)] R''(Q_t)} < 0$$

and, from equation (5),

$$\frac{\partial \theta_t}{\partial t} = \frac{\lambda^t \ln \lambda \theta_0 (1 - \theta_0)}{(\lambda^t \theta_0 + 1 - \theta_0)^2} < 0,$$

we obtain

$$\frac{dQ_t}{dt} = \frac{\partial Q}{\partial \theta_t} \frac{\partial \theta_t}{\partial t} > 0.$$

Hence, in every ongoing partnership, the volume of trade increases over time and converges to  $Q(0; \lambda, \alpha, c)$ , the level reached when contracts are perfectly enforced. This result captures in a clear way the idea that trust is built over time, through repeated interactions. While an exporter is learning about the type of his partner, he exports less than he would under perfectly enforceable contracts. Thus, in the first stages of a partnership, relatively low quantities are exported; if the distributor appears to be reliable, the exporter then progressively improves the volume exported. This result rationalizes the practice of "start small and increase quantities over time" referred to in the Introduction. If this process continues until the exporter becomes sufficiently convinced that his distributor is patient, the lack of contract enforcement becomes effectively inconsequential. Hence, in line with the empirical findings of Johnson et al. (2002), sufficiently long-lasting partnerships overcome all problems created by informational frictions.

At any time, the volume of trade within an ongoing partnership is affected also by the institutional setting of the Foreign economy. We study this issue by describing how changes in  $\lambda$  affect current and future contracts between the exporter and the distributor. Suppose that, at the beginning of date  $t$ , there is an institutional development in Foreign that reduces the number of corrupt legal agents—e.g., an increase in the costs of being caught. This change will then increase the proportion of international contracts enforced in Foreign. Let the resulting institutional parameter be denoted by  $\lambda$ , where the subscript  $t$  on  $\lambda$  indicates that the change takes place at date  $t$ . Clearly, the immediate effect of this change is an improvement in the volume of trade, just as Johnson et

al. (2002) find for partnerships in transition economies:

$$\frac{\partial Q_t}{\partial \lambda} = \frac{-\theta_t R'(Q_t)}{[1 - \theta_t(1 - \lambda)] R''(Q_t)} > 0.$$

Since the exporter anticipates that he will receive his share of the total revenue with a higher probability, he is willing to export more.

Note that the distributor's reputation at  $t$  is not affected by the increase in  $\lambda$  at that date. This is so because reputation is a function of *past* levels of contract enforcement, not the current one. On the other hand, the change in  $\lambda$  affects the *future* reputation of the distributor. Consider, for example, his reputation at date  $t + k$ ,  $k > 0$ . From equation (5), we obtain

$$\frac{\partial \theta_{t+k}}{\partial \lambda} = \frac{\lambda^{k-1} \theta_t (1 - \theta_t)}{(\lambda^k \theta_t + 1 - \theta_t)^2} > 0.$$

Hence, a further implication of the improvement in the institutional setting of Foreign is that it *reduces* the future reputation of distributors, relative to what they would have been under the lower  $\lambda$ . Intuitively, a higher  $\lambda$  makes it less clear for an exporter that the distributor is complying with the contract voluntarily, rather than motivated by the threat of a legal challenge.

As a result, the net impact of an institutional change in Foreign on future export volumes is not as transparent as its contemporaneous effect is. We have that, for all  $k > 0$ ,

$$\frac{dQ_{t+k}}{d\lambda} = -\frac{R'(Q_{t+k})}{[1 - \theta_{t+k}(1 - \lambda)] R''(Q_{t+k})} \left[ \theta_{t+k} - (1 - \lambda) \frac{\partial \theta_{t+k}}{\partial \lambda} \right]. \quad (11)$$

There are two effects in play here. First, an increase in  $\lambda$  at date  $t$  has a direct positive effect on exports in period  $t + k$  for the same reason it has in date  $t$ . This effect is represented by the first element in the square bracket of equation (11). But there is also an indirect negative effect due to the slower improvement in the distributor's reputation associated with the increase in  $\lambda$ , represented by the second element in the square bracket of equation (11). The net impact depends on the comparison between these two forces. That is, an increase in  $\lambda$  at date  $t$  improves the export volume at date  $t + k$  beyond its original trend if and only if

$$\theta_{t+k} > (1 - \lambda) \frac{\partial \theta_{t+k}}{\partial \lambda}. \quad (12)$$

We can rewrite this inequality as

$$\eta(\theta_{t+k}, \lambda) \equiv -\frac{\partial \theta_{t+k}}{\partial (1 - \lambda)} \frac{(1 - \lambda)}{\theta_{t+k}} < 1,$$

where  $\eta(\theta_{t+k}, \lambda)$  indicates the date  $t + k$  elasticity of the distributor's reputation with respect to a date  $t$  change in the institutional setup in Foreign. The intuition is clear: the overall effect of

an increase in  $\lambda$  on future export volumes is positive as long as it does not induce large changes in the process of reputation building. That is, it is positive as long as the time  $t + k$  reputation is inelastic with respect to changes in  $\lambda$  at time  $t$ . Inequality (12) can be written also as follows.

**Proposition 2** *An increase in  $\lambda$  at date  $t$  improves the export volume at date  $t + k$  beyond its original trend if and only if*

$$t + k < \frac{\lambda}{1 - \lambda} \frac{1 - \theta_0(1 - \lambda^{2t+k})}{1 - \theta_0}. \quad (13)$$

**Proof.** From (5), we have that  $\theta_{t+k}$  corresponds (when  $C = 0$ ) to

$$\theta_{t+k} = \frac{\lambda^{t+k}\theta_t}{\lambda^{t+k}\theta_t + 1 - \theta_t}.$$

Using this expression and calculating  $\partial\theta_{t+k}/\partial\lambda$ , we can rewrite inequality (12) as

$$t + k < \frac{\lambda}{1 - \lambda} \frac{1 - \theta_t(1 - \lambda^{t+k})}{1 - \theta_t}.$$

Using (5) again and manipulating, we obtain (13). ■

The two sides of inequality (13) are displayed in Figure 1. The condition implies that there is a value of  $\lambda$  for any  $t + k$ , say  $\lambda(t + k)$ , such that a small increase in  $\lambda$  at date  $t$  expands trade at date  $t + k$  for all  $\lambda > \lambda(t + k)$  but decreases it otherwise. In other words, there are "increasing returns to institutional quality" in terms of trade. The intuition is that, in economies with a weak enforcement structure, the exporter's belief about the distributor's type is very sensitive to changes in  $\lambda$ . In that case, a small tightening in the enforcement of contracts hurts the distributor's ability to increase his reputation significantly and, as a consequence, lowers the quantity exported in future periods. In contrast, in economies with stronger enforcement structures, the role of reputations is limited anyway, so when  $\lambda$  increases, its direct effect on trade prevails.

The impact of an institutional improvement on trade within an existing partnership is therefore subtle. The immediate effect is always positive, but a positive future impact relies on the economy having already a minimum level of enforcement structure.

Now recall that partnerships with patient distributors last forever, while partnerships with myopic distributors survive only if international contracts are enforced continuously in Foreign. More specifically, a partnership with a myopic distributor formed at date 0 will be in place at date  $t$  with probability  $\rho_t^m = \lambda^t$  for all  $t$ . An increase in  $\lambda$ , therefore, has also a positive effect on the *aggregate* level of trade, as it slows down the process by which partnerships with myopic distributors are terminated.

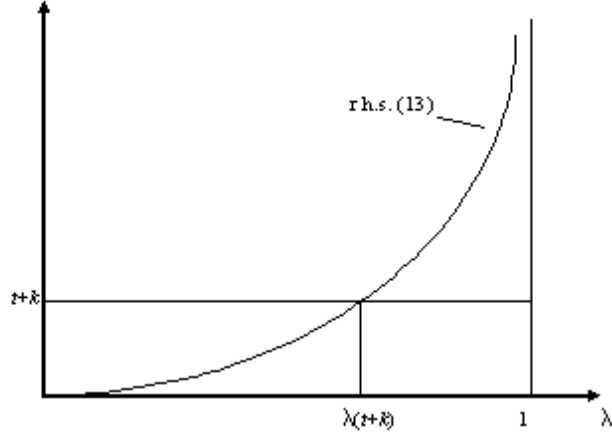


Figure 1: Right- and left- hand sides of inequality (13)

Nevertheless, in the long run the trade volume in the economy is the same that would be realized if types were perfectly known, since  $Q_t$  converges to  $Q(0; \lambda, \alpha, c)$  and  $\rho_t^m$  converges to zero as  $t$  goes to infinity. We show in the next section, however, that when the economy displays search frictions, informational frictions have a long-lasting impact on the economy.

## 6 Search Frictions

In this section, we add search frictions to our basic model in a way similar to Rauch and Trindade (2003). Rauch and Trindade consider an international economy where producers from Home randomly search for producers in Foreign to form a partnership. Producers in both countries are distributed across a continuum of different types, and the efficiency of a partnership depends on the distance between the types. Here, we adopt a simplified version of that structure by assuming that, in each attempt to find a distributor in Foreign, the producer meets with one capable of distributing his good with probability  $x \in (0, 1)$ . On the other hand, we differ from Rauch and Trindade also by allowing producers to search for foreign distributors in every period, instead of only once.

The presence of search frictions alters the dynamics of international trade significantly. First, since some producers always return home without a partner, the volume of trade at the *aggregate level* falls. Furthermore, this effect persists in the long run, since a positive measure of patient distributors never becomes involved in partnerships with exporters. This outcome arises even though the search process is costless and the probability that a patient distributor would be eventually within an active partnership, were the search process to continue indefinitely, would converge to one.

Thus, while in the long run an economy with only informational frictions replicates a frictionless economy, search frictions introduce a long-lasting impact.

To formalize these claims, let  $\theta_t(x)$  denote the producers' belief about the fraction of available myopic distributors at date  $t$  when the degree of search frictions is  $x$ . Proposition 3 then follows.

**Proposition 3** *For all  $x \in (0, 1)$  and  $t$ ,  $\theta_t(x) > \theta_{t-1}(x)$ . Moreover, there exists a  $t'$  such that, for all  $t \geq t'$  and  $x \in (0, 1)$ ,  $\theta_t(x) \geq \bar{\theta}$ . Hence, after date  $t'$ , producers without a partnership serve only the local market.*

**Proof.** Let  $m_1(p_1)$  be the measure of myopic (patient) distributors available for matches at date 1.  $m_1$  is equal to  $m_0$  times the probability that a distributor does not find an appropriate exporter,  $1 - x$ , plus  $m_0$  times the probability that this myopic distributor has entered in a partnership with an exporter but defaults on the contract in period 0,  $x(1 - \lambda)$ . That is,

$$m_1 = m_0(1 - x) + m_0x(1 - \lambda).$$

On the other hand, since patient distributors never default on the contract,

$$p_1 = p_0(1 - x).$$

Proceeding in a similar way, we can obtain the values of  $m_t$  and  $p_t$  after some computation:

$$m_t = m_{t-1}(1 - x) + x(1 - \lambda) \sum_{i=1}^{t-1} \lambda^i m_{t-1-i}$$

and

$$p_t = p_{t-1}(1 - x).$$

Given  $x$ , a producer's belief that an available distributor at date  $t$  is myopic is given by

$$\theta_t(x) = \frac{m_t}{m_t + p_t}.$$

Note that  $\theta_{t+1}(x) > \theta_t(x)$  as long as  $m_t > m_{t-1}(1 - x)$ , which is true for all  $x \in (0, 1)$ . Moreover, since

$$m_t > m_{t-1}(1 - x\lambda),$$

we have

$$\theta_t(x) > \frac{m_{t-1}(1 - x\lambda)}{m_{t-1}(1 - x\lambda) + p_{t-1}(1 - x)} > \dots > \frac{\theta_0(1 - x\lambda)^t}{\theta_0(1 - x\lambda)^t + (1 - \theta_0)(1 - x)^t}.$$

Finally, since

$$\lim_{t \rightarrow \infty} \theta_t(x) \geq \lim_{t \rightarrow \infty} \frac{\theta_0(1-x\lambda)^t}{\theta_0(1-x\lambda)^t + (1-\theta_0)(1-x)^t} = 1,$$

we can conclude that, for all  $x \in (0, 1)$ , there exists  $t'$  such that, for all  $t \geq t'$ ,  $\theta_t(x) \geq \bar{\theta}$ . ■

The intuition for this result is as follows. In every date, the pool of available distributors—i.e., those without a match—comes from two distinct sources. First, in every date  $t > 0$ , there is a probability  $1 - x$  that the producers who searched for partners at  $t - 1$  did not find appropriate distributors, in which case the latter remained available at  $t$ . Second, there are myopic distributors within partnerships at  $t - 1$  that failed to honor their contracts and caused the breakdown of their relationships. Thus, myopic distributors become available for new matches at a higher rate than patient ones do. As a result, the *ex ante* probability that an available distributor is myopic increases over time. Producers anticipate this process and adjust their priors accordingly. Eventually, their prior reaches  $\bar{\theta}$ , the threshold on beliefs defined in Lemma 1. At that point, non-exporting producers stop searching for distributors and remain producing only for the local market from then on. Since  $\bar{\theta} < 1$ , there will still be a positive measure of patient distributors who had not found adequate partners. Hence, the trade potential of the market is not fully realized even in the long run.

Note that an important feature underlying the result in Proposition 3 is the exporter's inability to observe the previous history of a distributor. In particular, upon meeting with a distributor at some date  $t > 0$ , the exporter does not know whether the distributor comes from a broken relationship or has simply never met with an appropriate exporter. Distributors from the first group are myopic with certainty; those from the second group are myopic with probability  $\theta_0 < \bar{\theta}$ .

In this context, a mechanism through which producers could learn the distributors' histories could prevent the adverse selection problem described in Proposition 3, and the search frictions would have no long-run effect on the level of international trade. The dissemination of such information could occur, for example, with the formation of business networks among producers.<sup>15</sup> Our framework provides a natural benchmark one can build on to study the role of such institutions. Consider, for example, the scenario where each producer discloses the identity of the distributors who had defaulted on a contract with him and this information becomes available to all other producers. Since this mechanism would allow producers to separate distributors with a history of no defaults from those with a previous default, an exporter's prior upon meeting a distributor from the latter group would be 1, while the prior upon meeting a distributor from the former group would be instead  $\theta_0$ . Under these conditions, producers would never stop searching for an appropriate

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<sup>15</sup>Rauch (2001) provides an insightful survey of that literature, including the broad empirical support for the effects of networks. As he points out, dissemination of information is one of the main roles of networks in international trade.

partner in Foreign. As a consequence, all patient distributors would eventually form a partnership, since the measure of patient types without a match,  $(1 - x)^t$ , goes to zero when  $t$  goes to infinity.

## 7 Trade Policy

We now look at the impact of trade policy on the dynamics of trade. First, we look at the intensive margin effects, i.e., the impact of a tariff change on the volume of trade within a partnership. We then consider the extensive margin effects of such a policy.

### 7.1 Intensive margin

When a producer from Home has to incur in an ad valorem tariff  $\tau$  to export to Foreign, his choice of how much to export is altered. In that case, the exporter's expected profit becomes

$$\pi(q, \theta; \lambda, \alpha, c, \kappa, \tau) = -cq + \alpha[\theta\lambda + 1 - \theta](1 - \tau)R(q) - \kappa.$$

Denote the exporter's optimal choice in this case by  $\hat{Q} = \hat{Q}(\theta; \lambda, \alpha, c, \tau)$ . Trade is lower with the tariff, since  $Q(\theta; \lambda, \alpha, c) = \hat{Q}(\theta; \lambda, \alpha, c, \tau = 0)$  and

$$\frac{\partial \hat{Q}}{\partial \tau} = \frac{R'(\hat{Q})}{(1 - \tau)R''(\hat{Q})} < 0. \quad (14)$$

Using equation (14), we can write the impact of a marginal *decrease* in the tariff rate as

$$-\frac{\partial \hat{Q}}{\partial \tau} = \frac{\hat{Q}}{(1 - \tau)\epsilon(\hat{Q})} > 0,$$

where  $\epsilon(\hat{Q}) \equiv -\frac{\hat{Q}R''(\hat{Q})}{R'(\hat{Q})}$  is the (negative of the) elasticity of the marginal revenue evaluated at  $q = \hat{Q}$ . For concreteness, suppose the following condition holds:

$$A5 : R'''(\hat{Q}) - \frac{(R''(\hat{Q}))^2}{R'(\hat{Q})} < 0.$$

This condition, which is equivalent to assuming that  $\frac{\hat{Q}}{\epsilon(\hat{Q})}$  is a decreasing function, holds if  $R'''(\hat{Q})$  is not 'too large' (i.e., if  $R'(\hat{Q})$  is not 'too convex'). It is satisfied, for example, by linear demands. The condition implies that the effect of a tariff reduction on imports is greater, the smaller the initial import level,  $\hat{Q}$ .

Now, recall that  $\hat{Q}$  depends on the institutional parameter and on the exporters' beliefs about distributors. For example, trade volumes are, at any period, decreasing functions of the measure of

myopic distributors ( $\theta_0$ ). Hence, it follows that under A5, the *effectiveness* of trade liberalization is greater in societies where more agents are believed to be myopic. Although this is beyond the scope of our model, it could be argued that this is more likely to be the case in countries where the economic environment is less predictable and the rule of law is weak. It is precisely in those societies that trade liberalization would tend to have the greatest impact on trade.

For given  $\theta_0$  and  $\lambda$ , trade within a partnership is a decreasing function also of  $\theta_t$ , which in turn falls monotonically over time. It follows that lower tariffs are more effective in raising trade in fledgling partnerships than in mature ones. Thus, history matters not only for trade volumes, as Eichengreen and Irwin (1998) argue, but also for the efficacy of trade liberalization.

Now, since the effect of  $\lambda$  on  $\hat{Q}$  depends on the horizon of the analysis, so will the impact of better enforcement of contracts on the effectiveness of trade liberalization programs. Under A5, weaker enforcement of contracts amplifies the response of trade volumes to tariff reductions, for given beliefs. But institutions also shape the dynamic responses of trade volumes to tariff reductions, through their influence on the process of reputation building. In the short run, then, the efficacy of trade liberalization is reduced by an increase in  $\lambda$ . On the other hand, if the initial level of contract enforceability is too low, the analysis of Section 5 suggests that an increase in  $\lambda$  can induce more future trade. In that case, better enforcement of contracts could also increase the long-run efficacy of lower trade barriers in promoting trade.

In any case, the important message here is that the effectiveness of trade liberalization will in general hinge on the quality of the country's institutions. Without taking that into account, one could either underestimate or overestimate systematically the effects of tariff reductions on a country's imports. Similarly, inter-country comparisons of the effects of trade liberalization would produce inaccurate results if institutional quality were not controlled for.

## 7.2 Extensive margin

We now look at the impact of a tariff change on the number of ongoing partnerships, i.e., its extensive margin effects. First, we establish the relationship between the tariff  $\tau$  and  $\bar{\theta}$ . Clearly, since  $\hat{Q}$  is a decreasing function of  $\tau$ , the same is true for the expected profit. Specifically, (and denoting expected profit by  $\pi(\theta, \tau)$  to shorten the notation) we obtain:

$$\frac{\partial \pi(\theta, \tau)}{\partial \tau} = -\alpha[\theta\lambda + 1 - \theta]R(\hat{Q}) < 0.$$

We can then compute the exporter's value function as

$$\tilde{v}(\theta_0, \tau) = \pi(\theta_0, \tau) + \sum_{i=1}^{\infty} \delta_e^i \pi(\theta_i, \tau) \prod_{j=0}^{i-1} (1 - \theta_j + \lambda\theta_j).$$



Moreover,

$$\frac{\partial \tilde{v}(\theta_0, \tau)}{\partial \tau} = -\alpha[\theta_0\lambda + 1 - \theta_0]R(\hat{Q}_0) - \sum_{i=1}^{\infty} \alpha[\theta_i\lambda + 1 - \theta_i]R(\hat{Q}_i) \prod_{j=0}^{i-1} (1 - \theta_j + \lambda\theta_j) < 0.$$

That is, a decrease in the tariff raises the value of entering into a partnership. By applying the same reasoning used in the proof of Lemma 1, we can then conclude that there exists a  $\bar{\theta}(\tau)$  such that an exporter enters into a partnership if and only if his prior is below  $\bar{\theta}(\tau)$ . Moreover, a decrease in the tariff increases  $\bar{\theta}(\tau)$ .

The existence of a negative relationship between the tariff level and the exporters' willingness to enter into a partnership implies that, in an economy where the impact of informational frictions is aggravated by the presence of search frictions, a decrease in the tariff would increase the number of partnerships in the long run. The proposition below proves this result.

**Proposition 4** *In an economy with search frictions, there exists an inverse relationship between the measure of partnerships in the long run and the level of the tariff.*

**Proof.** First, note that the dynamics of  $\theta_t(x)$  is not affected by the tariff level, since it depends only on the dynamics of the measure of myopic distributors without a partnership. Hence, the same result of Proposition 1 holds in an economy with the presence of an ad valorem tariff  $\tau$ . We only need to replace  $\bar{\theta}$  with  $\bar{\theta}(\tau)$ . Moreover, since a decrease in  $\tau$  raises  $\bar{\theta}(\tau)$ , the date  $t'$  at which  $\theta_{t'}(x) \geq \bar{\theta}(\tau)$  is also a decreasing function of  $\tau$ . As a result, after a decrease in  $\tau$ , exporters without a partnership will keep searching for a longer time before deciding to quit the foreign market. Clearly, this implies an increase in the measure of partnerships in the long run. ■

Thus, trade liberalization not only induces current exporters to export more; it also spurs entry in the foreign market. Naturally, this effect is stronger, the larger is the reduction in the tariff. The *nature* of the tariff change also shapes this effect. If the lower tariff is perceived to be temporary, it would have a relatively small impact on  $\tilde{v}(\theta_0, \tau)$ , and therefore would have only a minor effect on the extensive margin of trade. In contrast, if the lower tariff is perceived to be permanent, as we implicitly assumed above, it would have a much more significant impact on  $\tilde{v}(\theta_0, \tau)$  and on the extensive margin of trade. A similar analysis applies for the effectiveness of changes in exchange rates on trade flows. Overall, this sheds further light on the nature of the sunk costs necessary to start exporting, clarifying the role of expectations about policy in determining whether a firm will begin to export, and the reason why a firm that begins to export because of a shock (e.g., trade liberalization or a currency devaluation) may continue to export even when the shock is reversed.

## 8 Concluding Remarks

The idea that firms engaged in international trade build reputations to substitute for weak enforcement of contracts is intuitive and important empirically, as several recent studies have demonstrated. This paper is an initial step toward understanding the role of contract enforcement in international trade and the response of individual traders through the construction of reputations. We view this as a necessary development in an area where theory has lagged behind both intuition and empirics.

We carry out the analysis with a model that is very simple yet contains all the key ingredients to allow us to formalize the idea that inadequate enforcement of contracts matters for international trade. The model also helps to rationalize several stylized facts at the firm level. Moreover, we characterize the dynamics of trade and show that an institutional improvement has both a positive direct effect and a negative indirect effect, through the process of reputation building, on trade flows. We show how search frictions transmit and aggravate the problems created by inadequate enforcement at the micro level to the aggregate level. We indicate that the effectiveness of trade policy depends on the level of contract enforcement in the country, on the experience of the producers exporting to the country, and on the share of distributors in the country that are perceived to be forward-looking. We show, in addition, that trade liberalization mitigates the negative effects of search costs through its positive effects on the extensive margin of trade.

At the micro level, the main testable prediction of our model is that while a firm is exporting to a country, its exports should increase overtime if the level of contract enforcement in the country is weak, particularly in the first periods of export activity to that market. Such a prediction could be distinguished empirically from, for example, the one from the recent empirical literature on firms' export behavior. That literature is able to rationalize the fact that only very few firms export by relying on the existence of sunk costs to begin exporting, just as our model does by relying on incomplete information and imperfect enforcement. However, that line of research does not suggest any systematic trend in the level of exports of a firm after it breaks into a new market, in contrast to our model. With the exception of Eaton et al. (2004), it does not imply either that the costs to begin exporting should be market-specific. Our model suggests that they are, and provides a guideline to measure those costs—the level of contract enforcement in the country.

It is also worth pointing out that our structure is quite flexible, and as such it can be extended in several directions, which could provide further testable predictions and enhance the explanatory power of our model. For example, our model could provide insights into the incentives to form transnational networks, an issue that has not yet been formally analyzed, as Rauch (2001) points out. For that kind of analysis, some structure on the costs to form networks would be necessary. For

instance, there could be a fixed cost per period (say to finance the distribution of information) that each producer would have to pay to participate in the network. The gain from participating in such an organization varies, but is likely to increase over time, since the fraction of available distributors from broken partnerships increases over time, making it more important for an exporter to be able to distinguish between those distributors and the ones that have never entered in a partnership. It is then possible that participation may not be worthwhile initially, but becomes so as the adverse selection aggravates. The costs to coordinate or to disseminate information to producers may also be increasing in the size of the group. If so, networks and business groups may restrict membership, perhaps allowing only members who share some characteristic or have some common background that facilitates coordination. In such a case, a network might hurt outsiders.

One could also relax our assumption of identical marginal costs of production. Allowing for heterogeneous costs among producers could generate richer dynamics, because the threshold  $\bar{\theta}$  would become producer-specific. The reason is that higher marginal costs are associated with lower current and future profits and, thus, with lower overall gains from forming a partnership. The direct implication is that only the most efficient producers would export, corroborating a very robust finding in the empirical literature on plant-level export behavior. The model would display also Johnson et al.'s (2002) finding that a stronger legal system induces the formation of more partnerships. This would add an extra positive effect of stricter enforcement of contracts on the volume of international trade, and would also tend to enrich the analysis of trade policy.

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